



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/813,008	03/31/2004	Masaru Takaishi	AI 330	5247

7590 05/04/2005

RABIN & BERDO, P.C.
Suite 500
1101 14 Street, N.W.
Washington, DC 20005

EXAMINER

FARAHANI, DANA

ART UNIT PAPER NUMBER

2891

DATE MAILED: 05/04/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

SM

Office Action Summary

Application No.

10/813,008

Applicant(s)

TAKAISHI, MASARU

Examiner

Dana Farahani

Art Unit

2891

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 31 March 2004.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-10 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-10 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1-8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Huang (US Patent 6,215,176).

Regarding claim 1, Huang discloses in figures 2, 3, and 6, a semiconductor device 22 having a bottom surface 25 and mountable on a wiring board 70 with the bottom surface being opposed to the wiring board, the semiconductor device comprising:

- a semiconductor chip 22;
- a mold 26 encapsulating the semiconductor chip;
- a first heat spreader 29 joined to the semiconductor chip on the bottom surface side with respect to the semiconductor chip, and extending in substantially parallel with the bottom surface with both ends (the ends which are the lower edge ends at both sides of the reference numeral 55, shown in figure 3) thereof protruding from an edge of the mold when viewed in a direction perpendicular to bottom surface, the first heat spreader being capable of being joined to the wiring board by means of the both ends thereof;
- and

- a second heat spreader, 28 and 54, joined to the semiconductor chip on a top surface side opposite to the bottom surface with respect to the semiconductor chip, and extending in

Art Unit: 2891

substantially parallel with the bottom surface to cross with the first heat spreader with both ends 53 thereof protruding from the edge of the mold when viewed in a direction perpendicular to the bottom surface, the second heat spreader being capable of being joined to the wiring board by means of the both ends thereof (see figure 7), wherein one of the first and second heat spreaders is a lead frame electrically connected to the semiconductor chip. Although, Huang does not explicitly state the packaging mold 26 being resin, it would have been obvious to one of ordinary skill in the art at the time of the invention to use resin, since resin is conventionally used as packaging material in the chip packaging industry. See *In re Leshin*, 125 USPQ 416, for the proposition that it is within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use.

Regarding claim 2, the semiconductor chip falls within an intersection of the first and second heat spreaders completely when viewed in a direction perpendicular to the bottom surface (see figure 3).

Regarding claim 3, the first heat spreader 29 is exposed to the bottom surface of the semiconductor device.

Regarding claim 4, both the first and second heat spreaders are lead frames electrically connected to the semiconductor chip (note that the element 24 of figure 3 is a conductive paste).

Regarding claim 5, the semiconductor chip is provided with a field effect transistor, which is shown in figure 2, having a source electrode 44 and a drain electrode 46 and the drain electrode is electrically connected to the first heat spreader (see column 3, lines 39 and

Art Unit: 2891

40), and the source electrode is electrically connected to the second heat spreader (see column 3, lines 36-37).

Regarding claim 6, the semiconductor chip is connected wirelessly to one of the first and second heat spreaders, as can be seen in the figures.

Regarding claim 7, both of the first and second heat spreaders are lead frames electrically connected to the semiconductor chip, and the semiconductor chip is connected wirelessly to both of the first and second heat spreaders, as can be seen in the figures.

Regarding claim 8, the second heat spreader has a heat-spreading portion, the top portion that is bent and exposed to the outside of the packaging material 26, exposed through the mold on the top surface side of the semiconductor device.

3. Claims 9 and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Huang as applied to claim 1 above, and further in view of Long et al., hereinafter Long (US Patent 5,175,612).

Huang substantially discloses the claimed invention, as discussed above, except for a third heat spreader with a plurality of plates exposed through the mold.

Long discloses in figure 3, heat sinks 82 and 96, with plate-shaped portions 98 is provided for the semiconductor device 52. therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to use another heat sink in addition and joined to the heat sink/lead frame 28 of the Huang structure in order to even radiate more excess heat from the transistor in that structure.

Art Unit: 2891


Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Dana Farahani whose telephone number is (571)272-1706. The examiner can normally be reached on M-F 9:00AM - 5:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Bill Baumeister can be reached on (571)272-1722. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

D. Farahani


DAVID ZARNEKE
PRIMARY EXAMINER
4/29/05